



1 INTRODUCTION

1.1 Purpose

The purpose of this appendix is to provide guidance in the planning and installation of structured cabling systems. This standard specifies the City of Seattle's telecommunication cabling system for a commercial building that supports a multi-product, multi-vendor environment.

2 COMMUNICATIONS ROOM

2.1 General

The Communication Room provides space and access to pathways to support voice, data, video, and radio services. The telecommunications closets provide many different functions for the cabling system and are often treated as a distinct sub-system within the hierarchical cabling system. The section lists the cabling practices and guidelines for cross-connects and inter-connections.

2.2 Function

The primary function of a telecommunications closet is for the termination of horizontal cable distribution. All horizontal cabling is terminated on compatible connection hardware.

The cross-connection of horizontal cable terminations for data, phone, and other services use jumpers or patch cords. This allows flexible connectivity when extending various services to the work area outlet.

A Telecommunication closet provides a controlled environment to house telecommunication equipment, connecting hardware and splice closures.

2.3 Location

Locate Communications Rooms near permanent feature (i.e. staircases and airshafts for utilities, ventilation, and elevators), or in the core area. Provide direct access off of public hallways. Each Communications Room should not exceed 250ft. from the farthest distance point.

2.4 Number of Communications Rooms per floor

Limit the number of Communications Rooms per each floor to a minimum required to support the potential assignable square footage.

Provide a minimum of one Communication Room per floor except when:

- ◆ The area exceeds the farthest floor distance.
- ◆ Maximum cable distance exceeds 250ft.
- ◆ Communications Room space is limited.

2.5 Cable Tray

Install a cable tray in every Communications Room that does not have a raised floor. The cable tray will support all copper distribution from the work in area, data and voice equipment.

Size a cable tray for a 40% maximum fill capacity.

Several factors affect tray capacity:

- ◆ Number of outlets



- ◆ Square footage
- ◆ Unknown departmental cable quantities
- ◆ Low voltage cable
- ◆ Cable quantities, bottlenecks

Increase the size of those areas of cable tray most likely to incur heavy pathway use by localized cable, to decrease potential bottlenecks.

2.6 Sleeve Sizing

Sleeves must be used for cabling that leaves the Communications Rooms. 4" conduits support an average of 50-60 Category 5 cables.

2.7 Backboard

The Backboard is used to terminate cabling blocks and other components not mounted in a floor rack.

2.8 Communication Room Supplies

All supplies will be mounted on the wall.

- ◆ Broom and Dust Pan
- ◆ First Aid Kit
- ◆ Phone
- ◆ 3 foot ladder

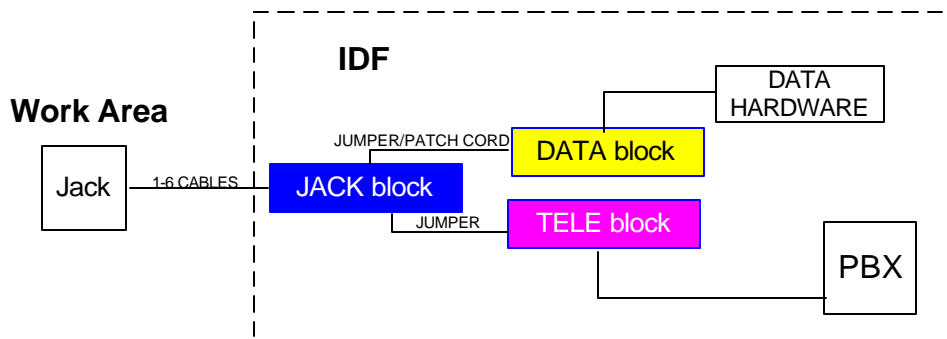
3 HORIZONTAL CABLING

3.1 General

The horizontal cabling is the part of the telecommunications cabling system that extends from the work area jack or outlet to the intermediate distribution frame (IDF). Use of cross-connects and patch cables are all part of the horizontal cabling system. The horizontal cabling system is design to allow any service to use a universal system. Primary uses are telephone and data.

Horizontal cabling means that the cables are run from the IDF horizontally above ceilings, and/or under or along floors.

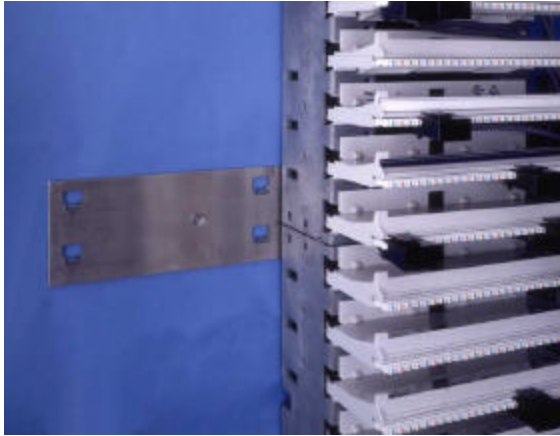
Horizontal Cabling- Fiber/Copper





4 Types of Terminations Blocks

4.1 110 System-Lucent VisiPatch Wall Mount



The **110UP-WB VisiPatch Wall Mount Bracket** is used to mount the 110UB1-336FT VisiPatch Field Terminated Kit on the wall. A minimum of two brackets is required for an installation. Brackets can be added one at a time after the first two are installed. Four brackets will accommodate up to (12) Field Terminated Kits and one column of 110U2R Distribution Rings with 110UTC VisiPatch Vertical Trough Covers. The back panel of the VisiPatch Kit easily mounts directly on the tabs of the brackets without the use of screws.

4.2 110 System-Siemon Rack Mount: PENDING

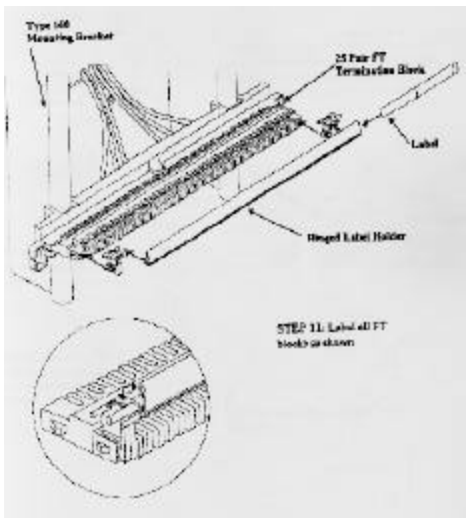
4.3 Krone Systems

4.3.1 High-band 8 pair block

4.3.2 Vertical 25 pair block

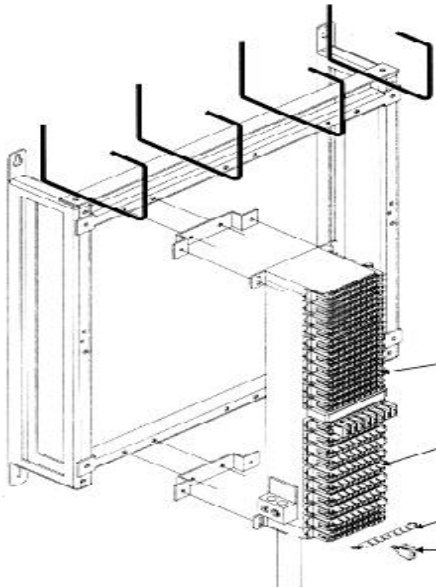
4.3.3 Horizontal 10 pair block

4.3.4 Horizontal 25 pair block



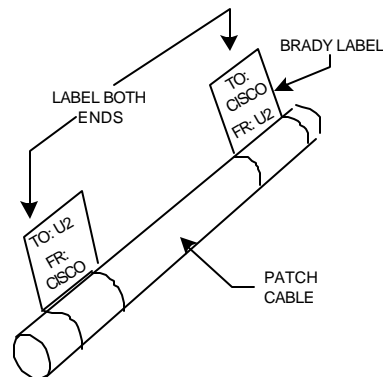


4.3.5 Wall Mount Frame used with Krone. 35.5 " Frame.



Cables

- ◆ Cables will be labeled with From and To location, on both ends to minimize workstation downtime.
- ◆ Cables from hardware to termination blocks will be labeled with port numbers.
- ◆ Power Cables will be labeled with which device associated with.
- ◆ Use the Brady LS2000 labels to help mark your cables.



4.4 Blocks

- ◆ Blocks will be labeled with color background that identifies which system supported.
- ◆ Blocks are color coded to represent which system is supported on the block.

Distribution- Blue

Management-Yellow

PBX-Purple

Riser-Green

Feed-Gray

Radio- Orange

jacks or outlet

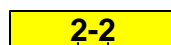
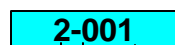
data switches or hubs

PBX or Octel switch

Vertical Riser Cabling

Horizontal Cabling between data closets (IDF's)

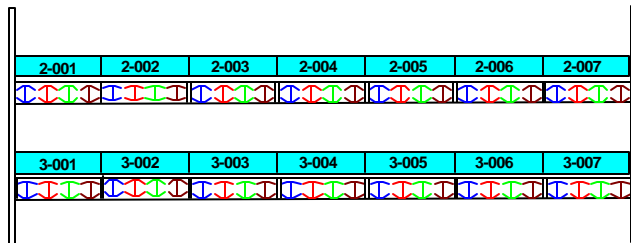
Radio disconnect blocks

FLOOR DATA
PORT

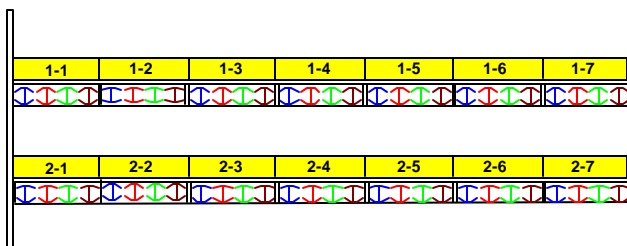
FLOOR JACK NUMBER (3 DIGIT)

**4.4.1 110 System**

Distribution Outlet/Jacks

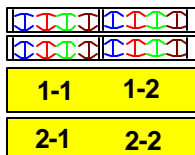


Data Components- Management

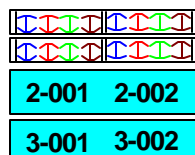
**4.4.2 KRONE SYSTEM**

High-Band

Management



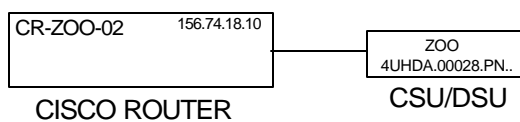
Distribution-Jack/Outlet

**4.5 Hardware**

All hardware will be labeled with:

DATA

- ◆ IP Address
- ◆ Device Name (*see naming standards document*).
- ◆ Circuit I.D. or SPIDs

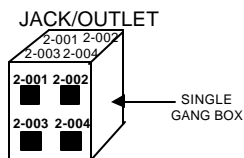




PHONE

4.6 Jacks/Outlets

- ◆ All jacks/outlets shall be labeled with a unique numbering scheme.
- ◆ No duplicate numbers within the same floor.
- ◆ When multiple floors share the same IDF, floor number will be present on the jack/outlet.
- ◆ When using single gang boxes, write jack/outlet numbers on top and in front of box.



5 Seismic

5.1 Cables

- 5.1.1 All cables should be attached to the backboard or racking by either tie wraps or a horizontal/vertical cable management system.

5.2 Hardware

5.2.1 Racking

5.2.2 Data/Phone Devices

- ◆ All devices should be either mounted in a rack or braced with tie-wraps or a strap.

6 Types of Patch Cable and Cross-Connects

6.1 VisiPatch 119 4-pair Adapter Cords



The **VisiPatch 119 4-pair Adapter Cords** are slate in color and feature the same "reverse patch cord" design as the VisiPatch 4-pair cord. The VisiPatch 119 Adapter Cord has a 4-pair 110 VisiPatch Plug on one end and the new D8CM 8-Pin Modular Plug on the other end. These cords are available in EIA/TIA 568B wiring and accommodate transitioning from the network equipment to the VisiPatch cross-connect field



6.2 Cross-connect Wire

7 Types of Cables

7.1.1 The City of Seattle uses various category types in the existing building cabling system. The current standard for new cable runs/jacks is the category 5e.

7.1.1.1 Four-pair 100 unshielded twisted pair (UTP) cables (Category 5e)

The UTP cable for use in the horizontal cabling system, consist of 24 AWG thermoplastic insulated solid conductors formed into four individually twisted pairs and enclosed by a thermoplastic jacket.

The cable shall be restricted to four-pair size to support a broad range of applications.

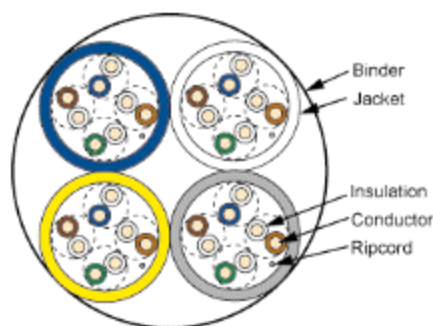
Color Codes:



Pair 1	White-Blue/Blue
Pair 2	White-Orange/Orange
Pair 3	White-Green/Green
Pair 4	White-Brown/Brown

Bundled Cables

Media-Pull Cables are multiples of individually jacketed components, such as 4 pair copper cable elements. Cable colors are: blue, white, yellow, gray.



The standard for all existing locations is 4 cables bundled per outlet.

The standard for all new locations is 3 cables bundled per outlet.

7.2 Horizontal Distances

The maximum horizontal distance from the distribution termination block to the work-in area jack/outlet shall not exceed 250 ft., dependent of media type. This is the distance for Category 5e copper standard, *currently in use and the standard for all new cable runs.*



The maximum distance from the cabling modular plug to the distribution termination block, which include cross-connects or patch cables within the IDF shall not exceed 40ft.

The maximum distance from the jack/outlet to the workstation shall not exceed 25ft.

7.3 Work-in Area Jacks/Outlets

7.3.1 Existing Locations (adding jacks to existing floors already cabled)

Standard outlet contains a minimum of four jacks per single gang box.

One outlet per station.

A outlet can support up to a maximum of six jacks per single gang box (if needed to support additional services).

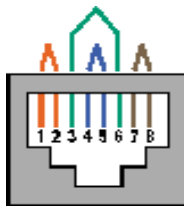
7.3.2 New Locations

Standard outlet contains a minimum of 3 jacks per single gang box.

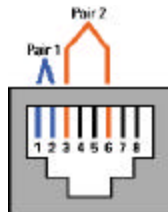
One outlet per station.

A outlet can support up to a maximum of six jacks per single gang box (if needed to support additional services).

7.3.2.1 Standard 8 position 568B plug / outlet.

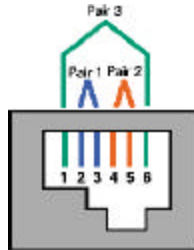


7.3.2.2 Position 10Base-T plug/outlet





- 7.3.2.2 6-position jack (modified modular jack or MMJ). It was designed by Digital Equipment Corporation® (DEC) along with the modified modular plug (MMP) to eliminate the possibility of connecting DEC data equipment to voice lines and vice versa.



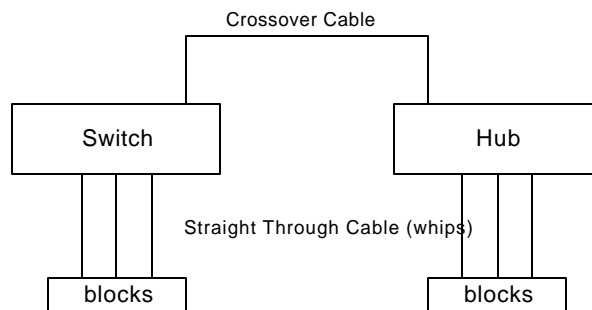
8. How to make a Crossover Cable.

Crossover cables are needed when connecting data devices to each other (daisy-chain). Straight-through cables are used for connecting workstations.

You need a standard straight through UTP-Cat5, 5e, or 6 cable.

Strip at least 1 inch of the main cable insulation and carefully trim the eight internal wires using the factory assembled end (RJ45) as a guide to the proper length. Just make sure each wire is equal length and that the connector cable lock pinches the main cable insulation.

Note: Even though pins 4,7,8 are not used it is mandatory that they are present in the cable.



Crossover Cable

RJ45 PIN	RJ45 PIN
1 Rx +	3 Tx +
2 Rc -	6 Tx -
3 Tx +	1 Rx +
6 Tx -	2 Rc -

Straight Through Cable

RJ45 PIN	RJ45 PIN
1 Tx+	1 Rc+
2 Tx -	2 Rc -
3 Rc +	3 Tx +
6 Rc -	6 Tx -

PIN # Signal EIA/TIA 568B

1 Transmit+ White/Orange



2	Transmit-	Orange/White or Orange
3	Receive+	White/Green
4	N/A	Blue/White or Blue
5	N/A	White/Blue
6	Receive-	Green/White or Green
7	N/A	White/Brown
8	N/A	Brown/White or Brown

9. Recommended Cabling practices:

DO:

- Use connecting hardware that is compatible with the installed cable.
- Terminate each horizontal cable on a dedicated telecommunications outlet.
- Locate the main cross-connect near the center of the building to limit cable distances.
- Maintain the twist of horizontal and backbone cable pairs up to the point of termination.
- Tie and dress horizontal cables neatly and with a minimum bend radius of 4 times the cable diameter.
- Place cabling at a sufficient distance from equipment

DON'T:

- Do not use connecting hardware that is of a lower category than the cable being used
- Do not create multiple appearances of the same cable at several distribution points (called bridged taps).
- Do not locate cross-connects where cable distances will exceed the maximum.
- Do not leave any wire pairs untwisted.
- Do not over-tighten cable ties, use staples, or make sharp bends with cables.
- Do not place cable near equipment that may generate high levels of electromagnetic interference.

End of Appendix 4 - B